

# Environmental Restoration

## Offsites: Salmon Site, Mississippi

### History

United States scientists developed the world's first atomic bomb at Los Alamos, New Mexico, in 1945.



*Salmon Site well in the 1960s.*

The development of the bomb was instrumental in bringing an end to World War II when the United States dropped atomic bombs on Hiroshima and Nagasaki, Japan, in August of that same year. The introduction of the atomic bomb precipitated the start of the Cold War between the United States and the Soviet Union in 1950 and a competition

between the two nations for superiority in a nuclear arms race. The race was temporarily halted in 1958, when both countries agreed to suspend all nuclear weapons testing.

To ensure the Soviet Union honored the moratorium, the United States began a program in which scientists experimented with two types of tests. The objective of the first test was to determine if secret underground detonations of nuclear devices could be detected. The second type of test compared a nuclear explosion with an earthquake. If scientists could

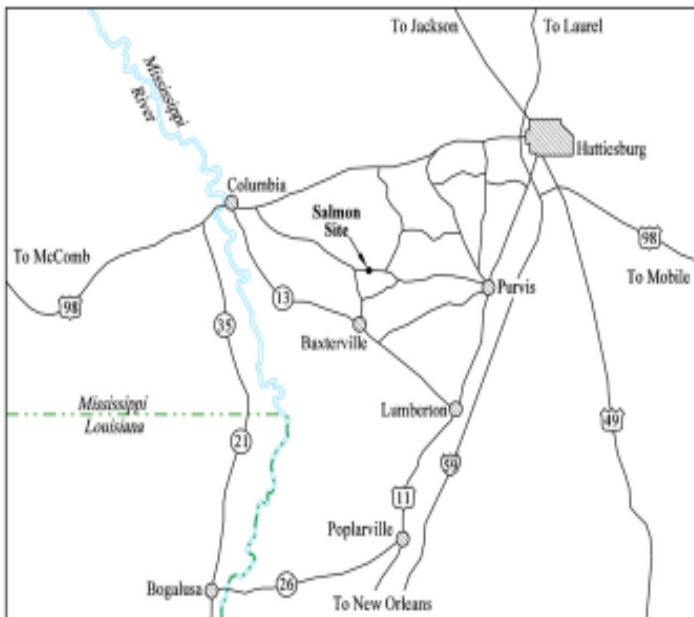
distinguish an earthquake from a nuclear test, then other nations would be unable to secretly test nuclear weapons. To test this theory, scientists proposed a study of underground shock waves or seismic signals sent by nuclear explosions in salt cavities. Salt domes were thought to be ideal locations for testing because salt is self-sealing, so radioactivity from the tests would remain inside the salt

dome. Scientists from the U. S. Atomic Energy Commission, the predecessor to the U.S. Department of Energy (DOE), chose the Tatum Salt Dome for underground nuclear testing because of its depth, salt purity, dimensions, and location.

The Salmon Site, formerly known as the Tatum Dome Test Site, is in a sparsely populated area about 32 kilometers (21 miles) southwest of Hattiesburg, Mississippi. Administration of this site is overseen by the DOE.



*Scientists prepare the Operation Dribble device at the Salmon Site.*



*General site map.*



Nuclear device testing resumed in 1961. In 1963 the United States and the Soviet Union signed the Limited Test Ban Treaty prohibiting nuclear testing in outer space, underwater, or in the atmosphere. As a result of the treaty, subsequent nuclear tests were conducted underground. All nuclear devices testing ended in 1992 when the United States imposed a moratorium on nuclear weapons testing.

Prior to the moratorium, the Salmon Site hosted two nuclear detonations in one underground salt dome. On October 22, 1964, scientists detonated a 5.3 kiloton device, Project Salmon, at a depth of 826 meters (2,710 feet). This explosion created an underground cavity 33 meters (110 feet) in diameter. On December 3, 1966, a smaller device (380 tons) was detonated inside the Salmon Site test cavity. Both tests were fully contained by the salt.

To provide information on the effect of reducing or masking shock wave signals, the site hosted two non-nuclear gas detonations. The first took place in 1969, and the second in 1970. Both occurred at approximately the same depth as the nuclear detonations and were each equivalent to 315 tons of dynamite. Again, the salt contained these explosions, and no gaseous materials or particulates reached the surface.



*EPA conducts annual groundwater monitoring throughout the site.*

## Past Activities

DOE conducted a surface cleanup of Salmon Site from 1971 to 1972, placed the contaminated soil and water in the test cavity, and then sealed the cavity. Contaminated equipment was shipped to the Nevada Test Site for disposal. Although DOE closed the site after this work was completed, its monitoring program with the



*EPA monitoring station in a local community.*

U. S. Environmental Protection Agency (EPA) continues. The Mississippi State Department of Health joined this program in 1977. Its extensive annual sampling activities include testing shallow wells, municipal water supplies, area vegetation, and milk from local dairy cows. More than 170 exploratory holes have been bored to identify the extent of contamination in near-surface soils and groundwater. Although a 1988 report, prepared by the EPA, reported some contamination of soil and groundwater near Surface Ground Zero (defined as the surface location above which the underground devices were positioned), they determined that the low levels of radioactivity present posed no risk to human health or the environment. Contamination was not detected at other parts of the site.



## Current Activities

In the spring of 1999, DOE completed a remedial investigation of the Salmon Site to learn more about the site's contamination. After purchasing the site



*A scientist conducts geophysical monitoring at*

from a private landowner in 1995, DOE was able to drill deeper wells and investigate soil and groundwater contamination closer to the test cavity. Salmon Site remedial investigation and study activities included: locating existing wells, wetlands and floodplains; identifying cultural resources; researching site history through personal interviews and records searches; characterizing previously disturbed areas that may have envi-



*Soil samples are collected around the site.*



*Woodland area adjacent to ground zero is cleared.*

ronmental impacts; continued sampling (soil, water, sediment, and vegetation); and conducting risk analyses. The primary contaminant detected during the remedial investigation was tritium, a residual from initial decommissioning activities. Tritium is present below the water table and in the subsurface in the vicinity of the Surface Ground Zero drilling mud pit area. Drilling mud pits were created as a result of these drilling activities, using drilling muds (bentomite, also known as clay) to drill the boreholes. This allowed for the placement of



*Samples are measured, divided, and placed in jars.*





*Samples are prepared for analysis.*

the devices underground as well as the conduct of post-shot sampling. The drilling mud was stored in the mud pits.

In conducting site activities, DOE follows all federal and state environmental laws and regulations. In addition, DOE is working closely with State of Mississippi representatives and officials to select the appropriate remedy for the site. Once the remedy is selected, DOE will conduct any required tasks. The closure activities will establish the long-term monitoring program for the site. In the meantime, DOE has committed to continue groundwater monitoring on an annual basis. A final report of site closure activities will be written and made available to the public.

To address public concern regarding groundwater contamination, DOE, in cooperation with the State of Mississippi and Lamar County Commissioners, proposed installing an extension of the existing rural public drinking water system in the area adjacent to the Salmon Site. DOE approved a \$2 million grant for the installation, which will carry drinking water into the homes of residents in the area adjacent to the site and mitigate concerns about groundwater contamination.

Throughout the investigation and site closure, DOE officials invite the public to participate. DOE officials plan to hold periodic public meetings to update residents on site activities. An Administrative Record/Information Repository containing key site documents has been established at the public library in Purvis, Mississippi.



*Salmon area residents participate in a DOE public meeting to discuss site issues and concerns.*



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For more information, please contact:  
**U.S. Department of Energy**  
**Nevada Operations Office**  
**Office of Public Affairs and Information**  
**P.O. Box 98518**  
**Las Vegas, NV 89193-8518**  
**(702) 295-3521**  
**<http://www.nv.doe.gov>**

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